DOCUMENT RESUME

ED 375 180 TM 022 192

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TITLE Mastery Learning Research in an International Context: Methodological Problems and Prospects.
PUB DATE Aug 93
NOTE 25p.; Paper presented at the Annual Meeting of the International Council of Psychologists (Montreal, Quebec, Canada, August 15-19, 1993).
PUB TYPE Reports - Evaluative/Feasibility (142) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Academic Achievement; Classification; *Cross Cultural Studies; Databases; Educational History; Educational Psychology; *Educational Research; Elementary Secondary Education; Foreign Countries; *Interdisciplinary Approach; *International Studies; *Mastery Learning; *Research Methodology; Research Needs; Research Problems

ABSTRACT

Mastery learning research focuses on learner-oriented and instruction-based factors that relate the concepts of time as a variable and high student achievement as a constant. This research emphasis encompasses optimistic assumptions about the capability of students to learn if: (1) alterable variables are optimized, and (2) diagnostic-instructional procedures based on a medical model of diagnostic-prescriptive interventions are used. Over the past 25 years, mastery learning research has gradually assumed an international character as evidenced by the professional literature. This proliferation, however, has occurred without a concerted effort to accommodate the special features of psychological and educational research in an international context. This paper addresses methodological issues that are initially problematic, yet potentially promising where mastery learning research in the international arena is concerned. Attention is given to such areas as: (1) cross culturalism spanning comparative education and international psychology; (2) multidisciplinary emphases; (3) international databases and resource personnel networks; and (4) a taxonomy of geographic and thematic progressions worldwide. (Contains 142 references.) (Author/SLD)

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Mastery Learning Research in an International Context: Methodological Problems and Prospects

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Revised version of a paper presented at the 51st annual convention of the International Council of Psychologists, Montreal, 15-19 August 1993.

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Abstract

Mastery learning research focuses on both learner-oriented and instruction-based factors that relate the concepts of time as a variable and high student achievement as a constant. This particular research emphasis in educational psychology encompasses two principal features: (a) an optimistic set of assumptions regarding the capability of students to learn if alterable variables comprising the conditions of learning are optimized and (b) an array of adaptive instructional procedures predicated on the medical model of diagnostic-prescriptive intervention.

Over the past 25 years mastery learning research has gradually assumed an international character as evidenced by the professional literature emanating from well over 30 nations throughout the world (Hymel & Dyck, 1992). This proliferation, though, of mastery learning efforts worldwide has occurred without the benefit of a concerted effort to accommodate those special features of psychological and educational research attempted in an international context. This paper, therefore, addresses those methodological issues that are initially problematic yet potentially promising where mastery learning research in the international arena is concerned.

Accordingly, attention is given to such areas as: cross-culturalism spanning primarily comparative education and international psychology; multidisciplinary emphases; international data bases and resource personnel networks; and a taxonomy of geographic and thematic progressions worldwide.

Mastery Learning Research in an International Context: Methodological Problems and Prospects

Mastery learning focuses on the relationship between the concepts of instructional/learning time as a variable and high student achievement as a constant. In the context of the 20th century, this conceptual and research emphasis can be traced initially to the efforts of Washburne (1922) and Morrison (1926) and, more recently, to the seminal work of Carroll (1963).

Carroll's Model of School Learning

John B. Carroll's (1963) model of school learning is a theoretical paradigm that describes the degree of learning that occurs in a school setting as a function of the time spent by a student on a learning task divided by the time needed by the student for the mastery of that task. The model, then, is formulated as follows:

Degree of Learning = f (Time Spent/Time Needed)

Additionally, Carroll's model suggests that a student's time needed to learn a particular task is determined by such variables as the student's aptitude and ability to understand instruction as well as the quality of instruction to which the student is exposed. Regarding the numerator in the model, time spent, Carroll identifies such factors as student perseverance on the learning task and opportunity to learn as the principal determining variables.

Mastery Learning's Two Dimensions

Essentially, mastery learning may be characterized as an increasingly expanding research area in educational psychology that entails two major dimensions (Bloom, 1968, 1976, 1978, 1980): First, it encompasses an optimistic set of theoretical assumptions regarding the capability of students to learn what we have to teach them provided that certain alterable variables constituting the essential conditions of learning are optimized. Secondly, it incorporates an array of adaptive instructional procedures reflective of the medical model of diagnostic-prescriptive intervention. Success or failure in school learning, then, is largely an artifact of the extent to which we adequately accommodate specific learner-based and instruction-oriented variables considered to be alterable rather than static.

Regarding the optimistic theoretical assumptions of mastery learning, Bloom (1968, 1971, 1976, 1978, 1980) and his colleagues (most notably: Anderson & Block, 1975; Block, 1971, 1980, 1985) have argued that under favorable learning conditions the following expectations are indeed viable: (a) Most students--perhaps over 90%--can master what we have to teach them, thereby resulting in a desired negatively skewed distribution of achievement scores rather than the unfortunate though frequently cherished normal bell-shaped distribution of scores. (b) As many as 80% of our students can attain those high levels of achievement typically reached by only the top 20% of students. (c) Most students become very similar--rather than dissimilar--with respect to learning ability, rate of learning, and motivation for further learning as they progress more deeply into a given course and/or program of studies. (d) Profound advancements in student performance occur not only in the domain of cognitive learning but also in the affective realms of student attitudes, interests, self-concept, and mental health.

Concerning the adaptive instructional practices of mastery learning that reflect a type of diagnostic-prescriptive intervention, Anderson (1981) has focused on the following functions served by mastery learning components regardless of how they are named: (a) communicating positive expectations to students, teachers, administrators, and parents; (b) teaching new content/objectives within a larger subject-matter context and at appropriate levels of difficulty by way of relating the new learning to prior learning; (c) monitoring student learning via diagnostic-progress tests and making instructional decisions based on this ongoing evidence; (d) prescribing corrective work when needed to help students overcome errors and misunderstandings before they accumulate and interfere with subsequent learning tasks; and (e) basing student grades on their performance relative to pre-specified learnings that are sought rather than relative to the performance of other students.

Catalyst for Paradigm Shift

In both the theoretical and practical realms, then, mastery learning has served as a major catalyst for encouraging nothing less than a paradigm shift where the nature of learning and instruction is concerned. As suggested by Dyck (1976), Dyck and Wellens (1979), and Dyck and Wouters (1989), the dominant prediction-selection paradigm has emphasized such themes as a static conception of individual differences, revealing and analyzing individual differences, heterogeneity as outcome and purpose of instruction, norm-referenced testing, selection of talent, and a nominal period of instruction and learning. By way of contrast, these same authors characterize the emerging diagnostic-development or outcome-based paradigm associated with

mastery learning as highlighting such notions as pursuing equal outcomes, searching for alterable learner- and instruction-oriented variables, expecting success by virtually all students in the context of minimal variance, criterion-referenced testing, development of talent, and a focus on time-on-task.

Organizational Forms/Orientations of Mastery Learning

As indicated earlier, mastery learning is based on John B. Carroll's (1963) model of school learning that relates the time factor in school learning to the degree of learning that actually occurs. Accordingly, mastery learning has assumed two basic organizational forms: (a) Bloom's (1968) Learning for Mastery (LFM) approach that is group-based and teacher-paced, has evolved primarily from the field of education, and has had its major impact at the elementary and secondary levels of schooling; and (b) Keller's (1968) Personalized system of Instruction (PSI) strategy that is more individually-based and student-paced, has evolved principally from the discipline of psychology, and has had its principal influence at the college/university level of education. Block and Burns (1976) provide perhaps the most succinct yet comprehensive characterization of these two organizational forms of mastery learning.

Mastery Learning Considered Internationally: An Overview

Over the past 25 years since the appearance of Bloom's (1968) article titled "Learning for Mastery," most of the mastery learning literature has focused on the North American experience and its socio-psycho-cultural interpretations with only occasional documentation of mastery learning efforts in Western Europe, Asia, the Middle East, South America, and Australia (Anderson & Block, 1985; Hymel, 1990, 1991; Thomas, 1985). This pattern had been suggested earlier--and later corroborated--by entries in a comprehensive bibliography on mastery learning (Hymel, 1982), state-of-the-art literature reviews on mastery learning (Block & Burns, 1976; Guskey & Gates, 1986; Guskey & Pigott, 1988; Kulik, Kulik, & Bangert-Drowns, 1990; Kulik, Kulik, & Cohen, 1979), and attempts to identify major gaps in the literature that suggest future directions for mastery learning efforts (Hymel, 1990, 1991).

In response to this paucity of a worldwide perspective on mastery learning in the professional literature, a paper (Hymel & Dyck, 1992) delivered last year at the 25th International Congress of Psychology in Brussels attempted to initiate an international focus on mastery learning. Included among the several objectives of that paper was the acknowledgment of mastery learning efforts in approximately 30 nations beyond North America. A review of those efforts is provided later in this paper.

Mastery Learning's International Focus: Methodological Problems & Prospects

Mastery learning research conducted from an international perspective entails four major methodological issues specific to a worldwide focus: (a) cross-cultural considerations; (b) multidisciplinary emphases; (c) international data bases and resource personnel networks; and (d) taxonomy of geographic and thematic progressions. Embedded in each of these four methodological issues are certain tasks that are initially problematic yet potentially promising for mastery learning researchers in the international arena.

Cross-Cultural Considerations

As the internationalization of mastery learning research continues, it is essential that greater attention be given to cross-cultural themes that bear upon instruction and learning. Of concern here, obviously, is the necessity for examining from the vantage point of diverse cultures the validity of mastery learning's theoretical assumptions and instructional practices. It should be axiomatic that a belief system and instructional

strategy such as contained in mastery learning must certainly be scrutinized in terms of possible inconsistencies with the cultural milieu of any society in which it might be proposed.

This imperative for considering cross-cultural issues where the viability of both the theory and practice of mastery learning are concerned naturally lends itself to the literature available on international education (e.g.: Debeauvais, 1985b; Heater, 1985; Holmes, 1985; Husen, 1985; King, 1985; Ottobre, 1985; Perkins, 1985; Postlethwaite, 1985; Stone, 1985; Sutton, 1985). Equally pertinent--and in some instances perhaps even more critical than the international educational literature--are those sources on comparative education (e.g.: Anderson, 1985; Brickman, 1985; Coombs, 1985; Debeauvais, 1985a; Eckstein, 1985; Foster, 1985; Holmes, 1985a, 1985b; Ignas & Corsini, 1981; Irvine & Berry, 1988; Kallen, 1985; Noah, 1985; Porras-Zuniga, 1985; Rosier, 1985; Shade, 1989). Also, in view of mastery learning's most basic affiliation with the discipline of psychology, the expanding literature on international psychology indeed has a strategic role to play (see, e.g..: Ardila, 1982; Hall, 1990; McPherson, 1986; Moghaddam, 1987; Russell, 1984; Sexton & Hogan, 1992; Sexton & Misiak, 1984; and Smith, 1983). And perhaps even more to the point, cross-cultural psychology sources are critical to considerations of the diversity of human behavior and the cultural context in which it occurs (e.g.: Berry, Poortinga, Segall, & Dasen, 1992; Brislin, 1990; Laboratory of Comparative Human Cognition, 1986; Rogoff & Morelli, 1989; Shweder & Sullivan, 1993; Tharp, 1989).

In essence, then, this first methodological problem involves the necessity for mastery learning researchers to expand their investigations into cross-cultural themes that heretofore have been virtually ignored. The critical challenge here will be to examine the external validity or generalizability of mastery learning's (a) optimistic assumptions regarding the capability of students to learn efficiently and effectively and (b) the efficacy of diagnostic-prescriptive teaching as an instructional intervention. The potential promise of this effort, of course, should be that of greater insights regarding both the diversity and constancy of human learning as cultural variables change.

Multidisciplinary Emphases

Mastery learning research in an international context must embrace a more multidisciplinary focus than has historically been the case. This very same argument was initially advanced (Hymel, 1983) at the American Educational Research Association's (AERA) last annual meeting in Montreal in 1983, although the context of that discussion was not specifically in terms of international

considerations. This theme was again addressed three years ago in the following fashion:

> More emphasis (is needed) in the literature on those aspects of mastery learning that have their bases in the disciplines of psychology, sociology, philosophy, history, and anthropology. Admittedly, psychology and sociology do have their share of coverage in the mastery learning literature; however, even in those disciplines I suspect we have only started to unravel their role in the support of mastery learning theory and practice. Where philosophy, history, and anthropology are concerned, however, the mastery learning literature is virtually silent. Philosophical views of reality, truth, and values must be related to the concerns of mastery learning from the perspectives of both researchers and practitioners alike; to do otherwise would be to ignore the potential contributions of the most foundational of all academic disciplines. Historical antecedents to our 20th-century versions of mastery learning are, of course, essential to placing in proper perspective where we actually are now and how we arrived at this particular juncture. Cultural anthropology, particularly, may indeed add something to our thinking about mastery learning as we venture beyond the comfort (and, perhaps, constraints) of our own familiar settings to embrace a more pluralistic view of humankind's diversities and commonalities. (Hymel, 1990, pp. 15 & 19)

This second methodological challenge, then, entails the need for mastery learning researchers to step beyond the almost exclusive past reliance on educational psychology when investigating mastery learning's theory and practice. Variables as complex as learning and instruction demand a multifaceted focus if indeed we are to optimize across diverse cultural settings whatever potential exists in the mastery learning paradigm. And therein lies the potential promise of this effort to include along with psychologists the contributions of our colleagues from sociology, philosophy, history, and anthropology.

International Data Bases & Resource Personnel Networks

Critical to the continued internationalization of mastery learning research is the exhaustive use of current and potential data bases and resource personnel networks. A problematic feature of this task is that of identifying in an all-inclusive manner those relevant data bases and networks already in existence that may be germane to the mastery learning literature. Another challenge of this task is that of initiating efforts to establish

additional data bases and networks to address information needs not currently met by existing resources.

The role of data bases such as Psychological Abstracts and ERIC is foundational to locating mastery learning documents. These are further augmented by the British Education Index, the Bulletin signaletigue des Sciences de l'Education in France, EUDISED that spans 16 countries in Western Europe, the European Association for Research on Learning & Instruction (EARLI), and professional organizations specific to various nations. Other options that currently exist and need to be explored more extensively are the foreign affiliate membership rosters of major professional organizations wherein mastery learning has had a consistent forum (e.g., the American Educational Research Association and the American Psychological Association) as well as the membership of international organizations such as the International Council of Psychologists (ICP) and the International Association of Applied Psychologists (IAAP). These membership lists are useful in conjunction with those of national organizations as a basis for periodic mailed surveys inviting input on mastery learning efforts that are not included in the data bases mentioned earlier.

With respect to personnel networking, Sexton and Hogan's (1992) recent edited work titled International psychology: Views from around the world appears to be a landmark source that offers the possibility of identifying resource personnel throughout the world who might serve as entrees to mastery learning research not yet recognized via data bases mentioned earlier. In this regard, several entries in the book are authored by psychologists whose discussions of educational psychology, school psychology, developmental psychology, psychometrics, and/or teacher education in various European countries could very well lead to an expanded network of researchers and practitioners whose work perhaps relates to the issues inherent in mastery learning. These authors and their national affiliations (not reflecting some of the more recent geopolitical changes in national boundaries and names) are as follows: N. C. de Kohan--Argentina; H. S. Pambookian--Armenia; M. C. Nixon--Australia; G. Guttmann and S. C. Etlinger--Austria; G. d'Ydewalle--Belgium; R. E. Grinder--Brazil; T. P. Hogan and M. P. Janisse--Canada; R. Ardila--Colombia; G. Bernal and W. Rodriguez--Cuba; D. Kovac--Czechoslovakia; A. E. Pacheco--Dominican Republic; F. A-L. H. Abou-Hatab--Egypt; P. Niemi--Finland; A. A. Sanches--France; A. Kossakowski--German Democratic Republic; J. Groebel--Germany; L. Houssiadas--Greece; D. Y-F. Ho--Hong Kong; J. Laszlo and C. Plek--Hungary; M. C. Joshi--India; I. Ayman and R. Ayman--Iran; T. Brady and J. McLoone--Ireland; Y. Amir and R. B. Ari--Israel; A. L. Comunian--Italy; S. Sukemune--Japan; G. Yoon--Korea; R. Diaz-Loving and P. V. Iturbe--Mexico; H. M. van der Ploeg--The Netherlands; G. Shouksmith--New Zealand;

H. Klove--Norway; Z. A. Ansari--Pakistan; E. Aldaba-Lim--Philippines; Z. Chlewinski--Poland; M. Grigoroiu-Serbanescu--Romania; J. Louw--South Africa; H. Carpintero--Spain; R. Burckhardt and R. Droz--Switzerland; G. Y. H. Vassaf--Turkey; L. F. Lowenstein--United Kingdom; J. L. Giuria--Uruguay; J. D. Hogan and V. S. Sexton--USA; A. Kozulin--USSR; J. M. Salazar--Venezuela; V. Pecjak--Yugoslavia; and J. Jordan--Zimbabwe.

Relative to the task of augmenting existing data bases and networks is the current effort to establish an International Society for Mastery Learning (see Hymel & Dyck, 1992, 1993a, 1993b) that would function partly as an international data base or repository for identifying, housing, consolidating, and monitoring mastery learning efforts worldwide. This proposed professional society would likewise sponsor forums both in printed form (e.g., quarterly newsletter and/or journal) and as biennial conferences (e.g., possibly in affiliation with existing organizations such as AERA, APA, EARLI, ICP, and/or IAAP).

The potentially promising aspect of this concern for data bases and personnel networks is, quite simply, the optimal recognition of mastery learning research efforts worldwide that have thus far not been comprehensively identified. Only when the international dimension of mastery learning is considered exhaustively can we have a true reading on what has transpired thus far and what remains to be explored.

Taxonomy of Geographic & Thematic Progressions

The following mastery learning citations represent authors, institutional affiliations, and/or research settings geographically positioned beyond the United States and Canada: Australia (Chan & Cole, 1986; Gay, 1984; Hermann, 1986; McBeath, 1986; Stanford & Imrie, 1981; Ward, 1979); Belgium (Dyck & Vanden Berghe, 1975; Dyck & Wellens, 1979; Dyck & Wouters, 1989; Dyck, Van de Looverbosch, & Wouters, 1982); Brazil (Keller & Sherman, 1974; Sherman, 1974); Chile (Pizarro Sanchez, 1992); China (Zhongliang, Xuyang, & Xiaoping, 1984); Cuba (Martuza, 1986); Egypt (Wahby, 1979); England (Arblaster, 1991; Backler, 1979; Collins, 1978; Gains, 1976; Hermann, 1986; Leith, 1983; Mercer, 1986; Miller, Norton, & Servant, 1979; Pennycuik & Murphy, 1986; Shale & Cowper, 1982; Spencer, 1990; Straker, 1988; Sumner, 1975); Finland (Lahdes, 1983); France (Council of Europe, 1975); Germany (Langeheine, 1992; Sandrin, 1990; Yildiran & Hackenberg, 1993); India (Chaudhari & Vaidye, 1986); Ireland (Whiting, 1982, 1984); Israel (Katz, 1986; Kremer-Hayon & Ben-Peretz, 1984; Lewy & Nevo, n.d.; Mevarech, 1986, 1991; Mevarech & Werner, 1985; Reves & Levine, 1990; Tenenbaum, 1986); Japan (Cummings, 1977); Korea (Kim, 1971, 1975; Lee, 1977); Lebanon (Reed, 1983); Malaysia

(Nordin, 1980); Mexico (Maginnitu, 1976); Netherlands (Boonstra, nd; Creemers, 1976; de Gruijtes, 1985; Reezigt & Weide, 1990; Slavenburg & Peters, 1989; Van der Linden, 1987; Vos, 1988; Warries, 1974, 1979; Weeda, 1982); New Zealand (Imrie, 1984; Studman, 1984); Nigeria (Badmus, 1976); Norway (Skaalvik, 1975); Puerto Rico (Canino & Cicchelli, 1988); Scotland (Drever, 1987; Johnstone, Mitchell, & Parkinson, 1980; Parkinson, Mitchell, & Johnstone, 1983; Peacock, 1981); Sweden (Dahllof, 1978; Fischbein, 1979); Switzerland (Flammer, 1973); Taiwan (Chen, 1987); Turkey (Yildiran, 1990-91). Evidence is also available for mastery learning's appearance in Singapore (E. Thomas, personal communication, April, 1992).

The thematic or topical areas addressed via mastery learning in the citations listed above are quite diverse and include the following: agriculture, biology, CAI, chemistry, comparative education, compensatory education, curriculum planning, computer sciences, developmental psychology, economics, evaluation, evaluative study, foreign languages, growth and development, geography, health science, language arts, LFM, library science, management, mathematics, microbiology, physics, PSI, psychometrics, reading, remediation, secondary education, science (general), teacher education, theory and/or practice of mastery learning, and vocational education/training.

The taxonomy of geographic and thematic occurrences of mastery learning just presented is, at this juncture, representative rather than exhaustive. Accordingly, a fourth major methodological issue facing mastery learning researchers internationally is that of working toward a complete identification of mastery learning efforts that have occurred worldwide. This task can be facilitated if the three earlier methodological issues pertinent to cross-culturalism, multidisciplinary emphases, and international data bases/resource personnel networks are accommodated. An anticipated outcome, then, would be a comprehensive classification of mastery learning research on the international scene. Such an exhaustive taxonomy would allow us to gauge more precisely where we have been and, by implication, where we might proceed in the quest to explore across cultures the viability of mastery learning's theory and practice.

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